

EFFECTS OF MULCHING AND INTERCROPPING ON UPLAND TARO

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Introduction

Mulching and intercropping are old and established practices used by farmers for protecting crops from adverse conditions and increasing productivity. Mulching has been used to help farmers control weeds, conserve soil moisture, minimize soil erosion, and in the case of pineapple in Hawaii, in soil fumigation through the use of polyethylene materials. Various materials have been used, such as dried rice straw, grass clippings, wood chips, sugarcane bagasse, dried leaves of coconut and banana, paper, and plastic or polyethylene sheets (Ekern 1967, Sivan 1984, Melchor and de la Peña 1987).

Intercropping provides faster turnover in farmers' investments when short term or earlier-maturing crops are intercropped with a base crop that takes a year or more to mature. Often, tree crops which take several years to start producing are conveniently intercropped with short term crops. Taro has been intercropped with longer maturing crops such as coconuts, banana, pineapple, and other tree crops (PCARR 1977).

The effects of different mulching materials as well as various intercrops on upland taro have been investigated at the Kauai Branch Station, College of Tropical Agriculture and Human Resources, University of Hawaii.

Materials and Methods

An upland taro field was prepared using commercial recommended methods of land preparation (de la Peña 1978, 1983). Before the last rotovation, 500 kg/ha of granular fertilizer 16-16-16 was broadcast and mixed with the soil. Plastic mulch 1.5 mils thick and 90 cm wide together with the double wall drip irrigation line were laid with a plastic laying machine at a distance of about 2 m center to center. Taro hulis, variety Bun-long, were planted in double rows through the plastic mulch at 45 cm between the rows and 60 cm in the row.

Six intercrop treatments were established after planting the taro. Each treatment plot was 4.5 by 12 m covering six double rows of taro. Intercrops were replicated three times in a randomized complete block design. The intercrops were planted one month after the taro crop was

planted in the unmulched areas between the plastic. The intercropped plots were sidedressed with 500 kg/ha 16-16-16 three months after the taro was planted.

Intercrops were harvested when they matured or when they were ready for harvest. One cutting of alfalfa was made before they were overshadowed by the taro plants. Sweet corn was harvested 85 days after planting, and peanut was harvested 100 days after planting. No harvest data was obtained from the bush beans and sweet potato. The sweet potato was left to serve as a cover crop until after the taro was harvested. Harvest samples of the taro were taken ten months after planting.

In addition to the plastic mulch used, other natural materials were used (rice straw, banana leaves, and corn stalks). An experiment with five treatments in three replications was installed using a randomized complete block design. The plots were also 4.5 m by 12 m with six double rows of taro. This experiment was also harvested ten months after planting.

Results

Intercropping

Yields at harvest (Table 1) showed that intercrops do not adversely affect the corm yields of upland taro, variety Bun-long. The yields ranged from a high of 50.58 t/ha with the peanut intercrop to a low of 37.04 t/ha for the control or no intercrop. Although differences in corm yields were not statistically significant, the increased yields of taro when intercropped with legumes indicate that added benefits from intercropping with beans and peanuts could be derived through their effects on soil fertility. These added benefits are consistent with earlier work using taro as the base crop in multiple and intercropping schemes (Sivan 1984).

Of the intercrops used, bush beans and sweet potato were not harvested. These were overshadowed by the taro plants and did not give significant and marketable yields. The sweet potato did not develop sizable edible roots but produced tops profusely which helped keep the soil moist.

One cutting of alfalfa gave a yield of 550 kg/ha (oven dried). Peanut gave an average yield of 1,030 kg/ha and

the sweet corn gave a mean yield of 6,015 kg/ha husked corn.

Table 1. Corm yield and growth measurement of upland taro as affected by intercropping (ten months).

Treatments (intercrops)	Corm yield (t/ha)	Growth measurements	
		Height (cm)	Suckers (no.)
Control	37.04	100	7.5
Bush beans	45.57	98	8.5
Alfalfa	49.80	105	9.0
Sweet corn	39.95	102	8.7
Sweet potato	40.19	88	3.2
Peanut	50.58	103	7.7
LSD (0.05)	ns	13	3.2

Mulching

Mulching with natural and artificial materials is greatly beneficial to upland taro. Table 2 shows that yields of unmulched taro even when weeds were kept under control are lower than mulched taro, which confirms the perceived benefits of mulching (moisture conservation and weed control). In addition, use of mulches provide more favorable soil conditions for crop growth such as the reduction of soil crusting under the mulch compared to a hard crust found where no mulch is present (Qashu and Evans 1967). Ekern (1967) also found that mulching with black plastic or polyethylene provided a more favorable growing temperature for pineapple in winter when air and soil temperatures are lower.

Table 2. Growth and yield performance of Bun-long grown under different mulching materials.

Treatments (materials)	Height (cm)	Suckers (no.)	Corm yield (t/ha)
Control	107.6 a	6.9 a	38.2 a
Plastic	109.1 a	6.9 a	40.0 a
Rice straw	114.9 ab	7.8 a	39.7 a
Banana leaves	121.6 b	9.1 b	50.7 a
Corn stalks	116.9 ab	9.2 b	48.9 a

Figures in a column followed by the same letter are not significantly different at 5% level.

References Cited

de la Peña, R. S. 1978. Upland taro. Hawaii Cooperative Extension Service, College of Tropical Agriculture,

University of Hawaii, Home Garden Vegetable Series No. 18.

de la Peña, R. S. 1983. Taro Agronomy. pp. 167-179. In J. K. Wang (ed.), Taro - A Review of *Colocasia esculenta* and its Potentials. University of Hawaii Press, Honolulu, Hawaii.

Ekern, P. C. 1967. Soil moisture and soil temperature changes with the use of black vapor-barrier mulch and their influence on pineapple (*Ananas comosus* (L.) Merr.) growth in Hawaii. Soil Science Society of America Proceedings 31(2): 270-275.

Melchor, F. M. & R. S. de la Peña. 1987. Dryland taro production under mulch. Hawaii Cooperative Extension Service, CTAHR, UH, Instant Information Series No. 16.

PCARR. 1977. The Philippines Recommends for Gabi 1977. Philippine Council for Agriculture and Resources Research, College, Laguna, Philippines.

Qashu, H. K. & D. D. Evans. 1967. Effect of black granular mulch on soil temperature, water content, and crusting. Soil Science Society of America Proceedings 31(3): 429-435.

Sivan, P. 1984. Effect of some intercrops on taro. pp. 103-107. In Proc. Symposium of the International Society for Tropical Root Crops, 6th, Lima, 1983. Lima, International Potato Center CIP.

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